

Atty. Dkt. No. 030481-0183

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A tool (101; 102) for inserting and mating two plug members (2, 3) of a sealing device (1) for closing a wound in the wall of a vessel, one plug member of the sealing device being a distal plug member (2) to be positioned inside the vessel and the other plug member being a proximal plug member (3) to be positioned outside of the vessel, the distal plug member being provided with an elongated retracting means (6) extending from the distal plug member, wherein

the tool comprises a gear mechanism (32; 132) coupled to the retracting means for converting a movement of the tool in a ^{straight line} proximal direction away from the wound, when the distal plug member is anchored in the vessel, to a pushing movement for moving the proximal plug member in a direction towards the distal plug member, the pushing movement being in response to a stretching force (F_1) in the retracting means.

2. (Previously Presented) The tool (101; 102) according to claim 1, wherein the tool comprises a spring-biased coupling means (41; 164, 166) for releasably coupling the retracting means (6) to said gear mechanism (32; 132).

3. (Previously Presented) The tool (101; 102) according to claim 2, wherein the biasing force of said spring-biased coupling means (41; 164, 166) is selected to release the retracting means (6) when the stretching force (F_1) in the retracting means exceeds a selected force attributed to the rupture - tension of the wall of the vessel.

4. (Previously Presented) The tool (101; 102) according to claim 1, wherein said tool comprises:

an outer feeding means (33; 133) for pushing the proximal plug member (3), said outer feeding means being provided with an axial through bore;

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an inner feeding means (34; 134) for pushing the distal plug member (2), said inner feeding means being provided with an axial through bore for moveably receiving said retracting means (6), said inner feeding means being disposed for movement in said bore of said outer feeding means, said gear mechanism (32; 132) being coupled to said inner feeding means and said outer feeding means; and

a pushing means (36; 150) for pushing the gear mechanism (32; 132), the outer feeding means (33; 133), and the proximal plug member (3), with respect to a casing (30; 130) of the tool, in a direction towards the wound.

5. (Previously Presented) The tool (102) according to claim 4 wherein said gear mechanism (132) comprises at least one of a set, the set comprising:
a gear rack (170a, 170b) fixed to said pushing means (150);
a cog rail (163a, 163b) connected to said outer feeding means (133);
a double gear wheel (168a, 168b) having a small gear ring (180) and a large gear ring (181) fixed with respect to each other, said double gear wheel being rotatably connected to a plate member (164), said large gear ring (181) being in engagement with said gear rack (170a, 170b), and said small gear ring (180) being in engagement with said cog rail (163a, 163b);
wherein

said plate member (164) is arranged to move with said outer feeding means and said plate member releasably holds the retracting means by means of a spring (166), the retracting means being moveably disposed in the bore of said inner feeding means, and wherein

said set is thereby cooperatively arranged to convert a proximal movement of said tool to a distal movement of said outer feeding means when the retracting means is stretched.

6. (Previously Presented) The tool (101) according to claim 4 wherein said gear mechanism (32) comprises:

a first pulley (38) attached to said outer feeding means via a spacer member (37);
a second pulley (40) attached to said inner feeding means (34);
a first brake means (41) attached to said inner feeding means;
a second brake means (43) attached to said pushing means (36); wherein

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the retracting means (6) is arranged such that it extends from the distal plug member (2) in a proximal direction, through said bore of said inner feeding means (33), through the first brake means (41), around said first pulley (38) to be redirected to a distal direction, around said second pulley (38) to be redirected again to the proximal direction, and through said second brake means (43).

7. (Currently Amended) A sealing device (1) comprising:

a distal resiliently expandable plug member (2) having an elongated retracting means extending centrally from a distal plug member and including a portion (10) for attaching a proximal plug member (3) of the sealing device, the proximal plug member being resiliently expandable and being adapted to be mounted onto the distal plug member to be fixed thereto by means of the attaching portion, wherein

the proximal plug member comprises a through bore (9), the distal plug member comprises a through bore (8), and a suture (6) is passed through said bore (8) to serve as the retracting means by providing an enlarged portion at one end as a counter when pulling the suture. *uniform cross-sectional in a portion extending through the plugs.*

8. (Previously Presented) A system for closing a wound in a punctured vessel, wherein a sealing device according to claim 7 is inserted and mated by the use of a tool.

9. (Previously Presented) A method for closing a wound in a punctured vessel with a tool, comprising:

inserting and mating two plug members (2, 3) of a sealing device (1), one plug member of the sealing device being a distal plug member (2) to be positioned inside the vessel and the other plug member being a proximal plug member (3) to be positioned outside of the vessel, the distal plug member being provided with an elongated retracting means (6) extending from the distal plug member;

positioning the distal plug member (2) inside the vessel with the retracting means (6) being attachable to the tool comprising a gear mechanism (32; 132) connectable to the retracting means for converting a movement of the tool in a proximal direction away from the wound, to a pushing movement for moving the proximal plug member in a direction towards

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the distal plug member in response to a stretching force (F_1) in the retracting means when the distal plug member is anchored in the vessel; and

withdrawing the tool (101; 102) with the retracting means attached thereto to stretch the retracting means, thereby activating the gear mechanism to approach the proximal plug member towards the distal plug member via a feeding means (34;134).

10. (Original) The method according to claim 9, wherein said tool (101; 102) comprises a spring-biased coupling means (41; 164, 166) for releasably coupling the retracting means (6) to said gear mechanism (32; 132).

11. (Previously Presented) A system for closing a wound in a punctured vessel according to claim 8, wherein the tool comprises a gear mechanism coupled to the retracting means for converting a movement of the tool in a proximal direction away from the wound, when the distal plug member is anchored in a vessel, to a pushing movement for moving the proximal plug member in a direction toward the distal plug member in response to a stretching force in the retracting means.

12. (Currently Amended) A tool (101; 102) for closing a wound by positioning a distal plug inside a vessel and a proximal plug positioned outside of the vessel, comprising:

a casing; and
a movement direction reverser (32; 132) adapted to be coupled to a retractor which is coupled to the distal plug, wherein the movement direction reverser, when coupled to the retractor, is adapted to convert movement of the casing in a proximal direction away from the wound when the distal plug is anchored in the vessel to a pushing movement to move the proximal plug in a direction towards the distal plug, the pushing movement to move the proximal plug being in conjunction with response to a tension force imparted on the retractor.

13. (Previously Presented) The tool (101; 102) according to claim 12, wherein the tool comprises a spring-biased coupling (41; 164, 166) adapted to releasably couple the retractor (6) to the movement direction reverser (32; 132).

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14. (Previously Presented) The tool (101; 102) according to claim 13, wherein the biasing force of said spring-biased coupling (41; 164, 166) is sufficient to release the retractor (6) when the force imparted on the retractor exceeds a selected force based on the rupture - tension of a wall of the vessel.

15. (Previously Presented) The tool (101; 102) according to claim 12, wherein said tool comprises:

- an outer feed boom (33; 133) adapted to push the proximal plug (3), said outer feed boom being provided with an axial through bore;

- an inner feed boom (34; 134) adapted to push the distal plug (2), said inner feed boom being provided with an axial through bore adapted to moveably receive said retractor (6), said inner feed boom being further adapted to move in said bore of said outer feed boom, said movement direction reverser (32; 132) being coupled to said inner feed boom and said outer feed boom; and

- a pusher (36; 150) adapted to push the movement direction reverser (32; 132), the outer feed boom (33; 133), and the proximal plug (3), with respect to the casing (30; 130) of the tool, in a direction towards the wound.

16. (Previously Presented) The tool (102) according to claim 15 wherein said movement direction reverser (132) comprises at least one of a set of components, the set of components comprising:

- a gear rack (170a, 170b) fixedly connected to said pusher (150);

- a cog rail (163a, 163b) fixedly connected to said outer feed boom (133);

- a double gear wheel (168a, 168b) having a small gear ring (180) and a large gear ring (181) fixed with respect to each other, said double gear wheel being rotatably connected to a plate (164), said large gear ring (181) being in engagement with said gear rack (170a, 170b), and said small gear ring (180) being in engagement with said cog rail (163a, 163b); wherein

- said plate (164) is arranged to move with said outer feed boom, and said plate is adapted to releasably hold the retractor with a device including a spring (166), the retractor being moveably disposed in the bore of said inner feed boom, and wherein

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said set is cooperatively arranged and adapted to convert a proximal movement of said casing to a distal movement of said outer feed boom in conjunction with a tension force on the retractor .

17. (Previously Presented) The tool (101) according to claim 15 wherein said movement direction reverser (32) comprises:

- a first pulley (38) attached to said outer feed boom via a spacer (37);
- a second pulley (40) attached to said inner feed boom (34);
- a first brake (41) attached to said inner feed boom;
- a second brake (43) attached to said pusher (36); wherein

the retractor (6) is arranged such that when the retractor is coupled to the movement direction reverser, the retractor extends from the distal plug (2) in a proximal direction, through said bore of said inner feed boom (33), through the first brake (41), around said first pulley (38) to be redirected in a distal direction, around said second pulley (38) to be redirected to the proximal direction, and through said second brake (43).

18. (Previously Presented) The tool (101; 102) according to claim 12, further comprising the retractor.

19. (Currently Amended) A method for closing a wound in a punctured vessel utilizing two plugs (2, 3) of a sealing device (1), comprising:

- inserting a distal plug (2) through a wound and positioning the distal plug inside the vessel and positioning a proximal plug (3) outside the vessel, the distal plug being provided with a retractor (6) extending from the distal plug;
- pushing the proximal plug towards the distal plug with a tool comprising a casing and a movement direction reverser (32; 132) coupled to the retractor by converting a movement of the casing in a proximal direction away from the wound to a pushing movement to move the proximal plug in a direction towards the distal plug, the pushing movement to move the proximal plug being in conjunction with response to a tension force on the retractor .

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20. (Currently Amended) The method of claim 19, wherein movement of the casing in the proximal direction results from withdrawing the tool (101; 102) with the retractor attached to the tool, wherein the tension force on the retractor results from withdrawing the tool (101; 102) with the retractor attached to the tool and the distal plug (2) anchored in the vessel, and wherein the tension force on the retractor ~~combines with the movement of the casing in the proximal direction causing~~ causes the movement direction reverser to drive the proximal plug towards the distal plug.

21. (Previously Presented) The method according to claim 19, wherein said tool (101; 102) comprises a spring-biased coupling (41; 164, 166) adapted to releasably couple the retractor (6) to said movement direction reverser (32; 132).

22. (Previously Presented) A sealing device (1) comprising:
a distal resiliently expandable plug (2) having an elongated retractor extending centrally from the distal resiliently expandable plug and including an attaching portion (10) adapted to attach to a proximal plug (3) of the sealing device, the proximal plug being resiliently expandable and being adapted to be mounted onto the distal plug and to be fixed thereto by the attaching portion, wherein
the proximal plug comprises a through bore (9), the distal plug comprises a
through bore (8), and a suture (6), the suture extending through said bore (8) and forming at least a portion of the retractor, the suture having an enlarged portion at one end that is adapted to provide a counter surface when a tension force is imparted on the suture.

23. (Previously Presented) A system for closing a wound in a punctured vessel, wherein a sealing device according to claim 22 is inserted and mated by the use of a tool.

24. (Previously Presented) A system for closing a wound in a punctured vessel according to claim 23, wherein
the tool comprises a movement direction reverser coupled to the retractor and adapted to convert movement of at least a portion of the tool in a proximal direction away from the wound, when the distal plug is anchored in a vessel, to a pushing movement for moving the

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proximal plug in a direction toward the distal plug in conjunction with tension force in the retractor.